

ANTITHAMNION DENSUM (SUHR) HOWE FROM CLARE ISLAND, IRELAND: A MARINE RED ALGA NEW TO THE BRITISH ISLES

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ABSTRACT - The diminutive marine red alga *Antithamnion densum* (Suhr) Howe (Ceramiaceae, Rhodophyta), previously known in the north Atlantic from three sites in north-western France, is reported from the subtidal of a wave-exposed site at Clare I., Co. Mayo, Ireland, where it grows epiphytically on various macroalgae. The previously restricted distribution of this species in the North Atlantic gave rise to speculation that it represented an introduced plant. The geographical isolation of the Irish locality and the restricted habitat in which plants were found suggests that *A. densum* may be native to the north eastern Atlantic. However, the finding of the *Trailliella*-phase of the adventive red alga *Bonnemaisonia hamifera* Hariot at Clare I. in 1911, shortly after it had been discovered on the south coast of England, indicates the potential for the transport of introduced species to the west coast of Ireland.

RÉSUMÉ - La petite Rhodophycée marine *Antithamnion densum* (Suhr) Howe (Céramiales) est connue de trois localités de l'Atlantique Nord, sur les côtes Nord-Ouest de France. Elle est maintenant signalée sur une côte exposée d'Irlande, à l'île de Clare (Co. Mayo), où elle vit dans l'infra-littoral, en épiphyte sur diverses Algues de grande taille. Son aire de distribution antérieure dans l'Atlantique Nord était réduite, ce qui donnait un caractère spéculatif à son statut d'espèce introduite. L'isolement géographique de la localité irlandaise, et le biotope restreint occupé par l'espèce, suggère une origine Nord-Est Atlantique pour *A. densum*. Cependant, le cas de la génération *Trailliella* de la Rhodophycée introduite *Bonnemaisonia hamifera* Hariot signalée à l'île de Clare en 1911, peu après sa découverte sur la côte Sud de l'Angleterre, montre la facilité de transport d'une espèce importée vers la côte Ouest d'Irlande.

KEY WORDS : Antithamnieae, Ceramiaceae, introduced species, range extension, Rhodophyta, Ireland.

INTRODUCTION

The marine red alga *Antithamnion densum* (Suhr) Howe (Tribe Antithamnieae, Ceramiaceae) is known in the north Atlantic only from two subtidal sites in Brittany (Beg-an-Fry in the Bay of Morlaix, N. Finistère and the Glénan Archipelago off S. Finistère; L'Hardy-Halos, 1968, as *Antithamnion defectum* Kylin), and from the lower intertidal of Pas-de-Calais (Wimeroux; Coppejans, 1981, as *Antithamnion cruciatum* (C. Agardh) Nägeli var. *defectum* Halos).

Athanasiadis (1990), in a review of the Antithamnieae of the North Atlantic, considered that *Antithamnion densum* was the earliest name for a complex of entities widely distributed in the south Atlantic and in the north and south Pacific. These included *A. defectum*, which was originally described from Friday Harbor, Washington, USA (Kylin, 1925), and North Atlantic populations are sometimes regarded as being introduced (Athanasiadis, 1990, p. 223). Recently, we have discovered plants of *A. densum* in the subtidal of Clare Island, Co. Mayo, off the mid-west coast of Ireland. The isolation of this population and its restricted subtidal habitat suggest that *Antithamnion densum* may be native to the north-eastern Atlantic.

OBSERVATIONS

Description of Irish plants

Thalli (Fig. 1) to 20mm in extent, spreading over the substratum by prostrate axes, only the apices growing erect to a height of 3-5mm before becoming attached by rhizoids; prostrate and erect fronds branched in one plane, 550-850 μ m wide; colour bright red; texture delicate and flaccid.

Apical cells of main axes 6-7 μ m wide, cutting off axial cells in a straight row (Fig. 2), these increasing to 40-70 μ m in diameter and 2.5-4.0 diameters, each young axial cell forming a pair of opposite whorl-branchlets in one plane (Figs 1-2), curved adaxially, 8-12 cells long and 20 μ m wide, the basal cell remaining isodiametric and unbranched, each of the next few whorl-branchlet cells elongating and forming an adaxial 4-8-celled branchlet in a comb-like pattern (Fig. 2), with the last 4-5 cells unbranched, the apical cell conical or with a blunt rounded tip, sometimes terminating when young in a hair cell 14-16 μ m long; gland cells (Fig. 3) borne occasionally on the first branchlet, which is then reduced to 1-4 cells long, ovoid, 12-14 x 6-7 μ m, covering part of two adjacent cells or the terminal cell; lateral indeterminate axes formed in the same plane as the whorl-branchlets, at intervals of 6-7 cells, the opposite whorl-branchlet completely suppressed; further lateral indeterminate axes and rhizoids developing from basal cells of whorl-branchlets, rhizoids (Fig. 3) formed singly or in pairs, 10-30 μ m in diameter, multicellular, terminating in multicellular discoid attachment pads; plastids initially discoid, becoming elongate.

Gametophytes not found.

Sporocytes (immature tetrasporangia?) pedicellate, formed in whorl-branchlets in place of lateral branchlets (Fig. 4), ovoid, 60-68 x 32-34 μ m, mature sporangia not observed, pedicel initially isodiametric, then elongating and cutting off a cell that develops into another sporocyte and pedicel, resulting in a small cluster of sporangia.

Habitat

Epiphytic on *Meredithia microphylla* (J. Agardh) J. Agardh growing on a subtidal cliff at 5-10m at a very wave-exposed site (Amphitheatre Rocks) off the south coast of Clare Island, Co. Mayo, Ireland (53°47'N; 10°5'W), 25 vi 1990, leg. C.A. Maggs and R. Forster.

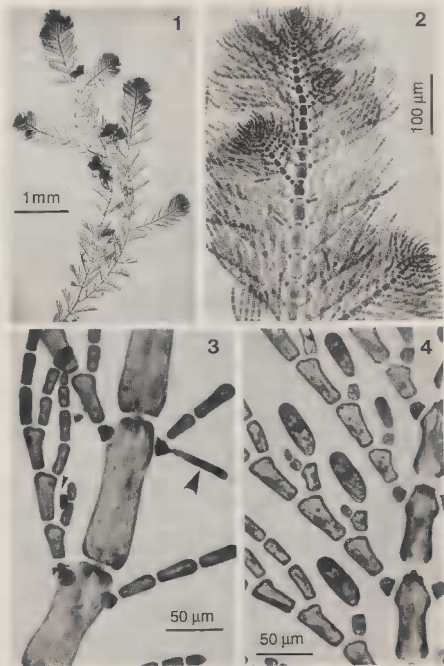
Herbarium material

Representative specimens of *Antithamnion densum* from Clare Island, mounted in corn syrup on microscope slides, have been deposited in the herbaria of the Department of Botany, University College, Galway (GALW) and the Natural History Museum - formerly known as the British Museum (Natural History) - London (BM).

DISCUSSION

Athanasiadis (1990) examined the type specimens of *Antithamnion defectum* Kylin from Friday Harbor, Washington, USA, and *Callithamnion densum* Suhr (= *Antithamnion densum* (Suhr) Howe) from Peru and concluded that they represented the same species. Wollaston (1972) and Yoshida (1981) had previously concluded that *Antithamnion setaceum* Gardner from Pacific North America and *Antithamnion sparsum* Tokida from Japan, respectively, were heterotypic synonyms of *A. defectum*. Athanasiadis (1990) also reported on additional collections of this species from the South Atlantic and the North and South Pacific and concluded that *A. densum* is widely distributed in warm and cold-temperate waters of both hemispheres. Culture studies of isolates from the north Pacific suggest that plants can grow at temperatures from 15-19°C (Boo & Lee, 1983; Garbary *et al.*, 1988) and reproduce between 16 and 19°C. Boo & Lee (1983) found that while crosses between strains of *A. densum* (as *A. sparsum*) from Korea produced viable carposporophytes, strains from Korea and California (identified as *A. defectum*) produced viable carposporophytes when male plants from Korea were crossed with female plants from California; the reciprocal cross did not produce any gonimoblast tissue. Boo & Lee (1983) concluded that this was an indication of incipient speciation. Nevertheless, the similarities in morphology between *A. densum*, *A. sparsum*, *A. defectum* and *A. setaceum* justify the conclusion (Athanasiadis, 1990) that these entities represent a single morphological species.

Although mature sporangia have not been collected, it seems likely that the structures observed were tetrasporocytes rather than monosporocytes or bisporocytes. Whittick & Hooper (1977) have described the paucity of reproduction in populations of *Antithamnion cruciatum* at the northern limit of



its distribution in insular Newfoundland. Of over 100 plants examined on two occasions, only one plant bore "developing sporangia" and the other bore what appeared to be zonately divided tetrasporangia, the only report of such sporangia in the Antithamnieae. Thus, near the northern limit of the distribution of antithamnioid algae, it may be that sporangia, although capable of developing, only rarely cleave into spores. However, it seems more likely in the Clare I. material that the sporangia were immature.

The discovery of *A. densum* in the subtidal of a wave-exposed site in a geographically isolated locality calls into question whether this entity is truly adventive in the North Atlantic. It is clear that the smaller algae of the subtidal are still poorly known in many areas, despite the widespread use of SCUBA diving. Additionally, expert knowledge of filamentous red algae is lacking, even amongst experienced field workers. Detailed examination in the laboratory is essential and even life-history studies may be necessary.

However, it would be premature to decide that *A. densum* is native to the North Atlantic since a red alga, *Bonnemaisonia hamifera* Hariot (Bonnemaisoniaceae, Bonnemaisoniales), which is clearly introduced, was first discovered in Ireland at Clare I. and in nearby Achill Sound in 1911 (Cotton, 1912), relatively shortly after it was discovered in Britain (Dorset in 1890; Westbrook, 1930), indicating that transport of an adventive species to the region is possible. *Cryptonemia hibernica* Guiry et L. Irvine, known only in the North Atlantic from the area around Cork Harbour on the south coast of Ireland, clearly has affinities with a complex of species known from the west coast of North America and is thought to have been introduced from this area (Guiry & Irvine, 1974).

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Figs 1-4. - *Antithamnion densum* from Clare I., Ireland. Fig. 1. Habit of plant removed from the blade of *Meredithia microphylla*. Fig. 2. Apex, with paired whorl-branches and alternately branched of indeterminate laterals. Fig. 3. Paired whorl-branches, with a gland cell (small arrow) and rhizoid (large arrow). Fig. 4 - Developing sporocytes borne adaxially on pedicels.

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